Midwest Technology Assistance Center
Groundwater Resource Assessment for Small Communities

Groundwater Availability
at
Mazon, Illinois
(Grundy County)

Project Overview
This project is an outgrowth of the Public Service Program of the Center for Groundwater Science (CGS) at the Illinois State Water Survey. For over 50 years, the CGS has provided groundwater information to any requesting individual, commercial facility or public water facility. Groundwater resource assessments have been an integral part of this public service and have been undertaken for thousands of individuals and facilities throughout its history. Community groundwater supplies that have been identified as potentially "deficient" are the targets for this project. The criterion used for determining community deficiency were; 1) Water Supply and Demand (operating time), 2) Aquifer Limitation, 3) Well Specific Capacity, and 4) Facility History. The Village of Mazon has been identified as a target community for groundwater assessment through this project.

Project Goal
To provide a resource tool of pertinent groundwater information to each target facility. This document describes a summary of historic information, current conditions and the potential for expansion of the water supply within 5 and 10 miles of Mazon.

Mazon (Grundy County)

The Village of Mazon, Grundy County, currently obtains groundwater from eleven community supply wells (Well #2(Local#2), Well #4(Local #1), Well #5(Local #3), Well #6(Local #4), Well #7, Well #8, Well #10, Well #12, Well #13, Well #14, Well #15 and Well #17(New No. 11)). The wells supplied an average of 83,700 gallons of water per day during 2005 to the Villages' 904 residents with an additional 36 residents outside the corporate limits. The Village also supplies 36 commercial services and 1 industrial service. The wells range in depth from 26 to 30 feet and pump between 12 to 60 gallons per minute. The project criterion ranked Mazon as "deficient" mainly due to its numerous shallow water table wells with low pumping capacities coupled with long production hours.

Historic Information

Background Well Information

Well No.2 (Local #2)
Finished in shallow sand and gravel deposits found within Section 23, T.32N., R.7E., Grundy County. The well was drilled to a depth of 26 feet in 1948 and, upon completion, reportedly produced 25 gallons per minute (gpm) for a short period of time.

Well No.4 (Local #1)
Finished in shallow sand and gravel deposits found within Section 23, T.32N., R.7W., Grundy County. The well was finished at a depth of 26 feet in 1962.

Well No.5 (Local #3)
Finished in shallow sand and gravel deposits found within Section 23, T.32N., R.7E., Grundy County. The well was drilled to a depth of 27 feet in 1963.

Well No.6 (Local #4)
Finished in shallow sand and gravel deposits found within Section 23, T.32N., R.7E., Grundy County. The well was drilled to a depth of 27 feet in 1978, and upon completion was pumped at 25 gpm for 2 hours with 1.5 feet of drawdown. Calculated specific capacity from this test was 16.7 gpm/ft. Static water level was reported as 14 feet below land surface.

Well No.7
Finished in shallow sand and gravel deposits found within Section 23, T.32N., R.7E., Grundy County. The well was drilled to a depth of 28 feet in 1978, and upon completion was pumped at 25 gpm for 2 hours with 1.5 feet of drawdown. Calculated specific capacity from this test was 16.7 gpm/ft. Static water level was reported as 12.5 feet below land surface.

Well No.8
Finished in shallow sand and gravel deposits found within Section 23, T.32N., R.7E., Grundy County. The well was drilled to a depth of 26 feet in 1978, and upon completion was pumped at 15 gpm for 0.5 hours with 3 feet of drawdown. Calculated specific capacity from this test was 5.0 gpm/ft. Static water level was reported as 11 feet below land surface.

Well No.10
Finished in shallow sand and gravel deposits found within Section14, T.32N., R.7E., Grundy County. The well was drilled to a depth of 27 feet in 1980, and upon completion was pumped at 23 gpm for 2 hours.

Well No.12
Finished in shallow sand and gravel deposits found within Section14, T.32N., R.7E., Grundy County. The well was drilled to a depth of 27 feet in 1987, and upon completion was pumped at 16 gpm for 3 hours with 3 feet of drawdown. Calculated specific capacity from this test was 5.3 gpm/ft. Static water level was reported as 5.2 feet below land surface.

Well No.13
Finished in shallow sand and gravel deposits found within Section14, T.32N., R.7E., Grundy County. The well was drilled to a depth of 27 feet in 1987, and upon completion was pumped at 28 gpm for 5 hours with 2.75 feet of drawdown. Calculated specific capacity from this test was 10.2 gpm/ft. Static water level was reported as 6.1 feet below land surface.

Well No14
Finished in shallow sand and gravel deposits found within Section14, T.32N., R.7E., Grundy County. The well was drilled to a depth of 28 feet in 1996, and upon completion was pumped at 20 gpm for a short period of time. Static water level was reported as 12 feet below land surface.

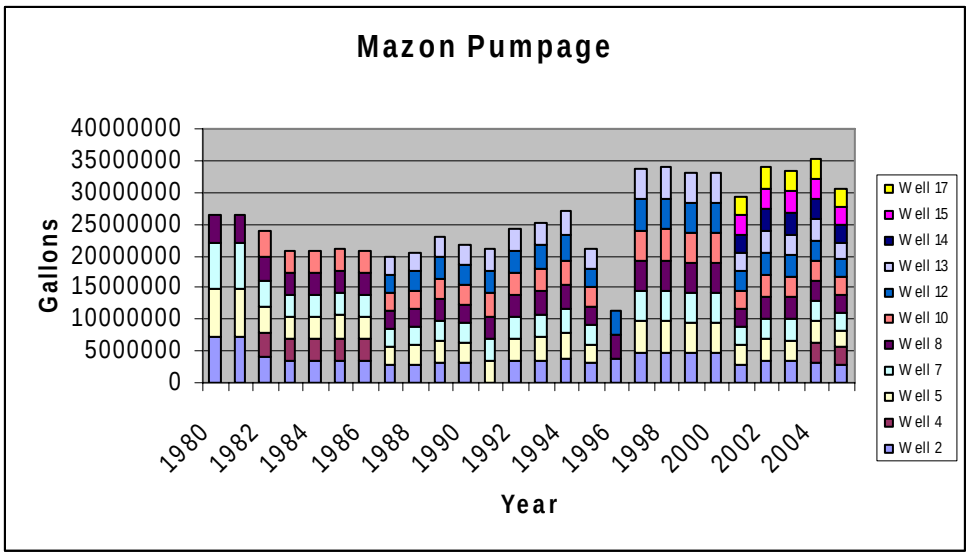
Well No.15
Finished in shallow sand and gravel deposits found within Section14, T.32N., R.7E., Grundy County. The well was drilled to a depth of 30 feet in 2000, and upon completion was pumped at 60 gpm for 12 hours with 8.5 feet of drawdown. Calculated specific capacity from this test was 7.1 gpm/ft. Static water level was reported as 11 feet below land surface.

Well No.17 (New No.11)
Finished in shallow sand and gravel deposits found within Section14, T.32N., R.7E., Grundy County. The well was drilled to a depth of 28 feet in 1996, and upon completion was pumped at 30 gpm for a short period of time. Static water level was reported as 10 feet below land surface.

Well No.18 (Local No.16) Not Currently in use

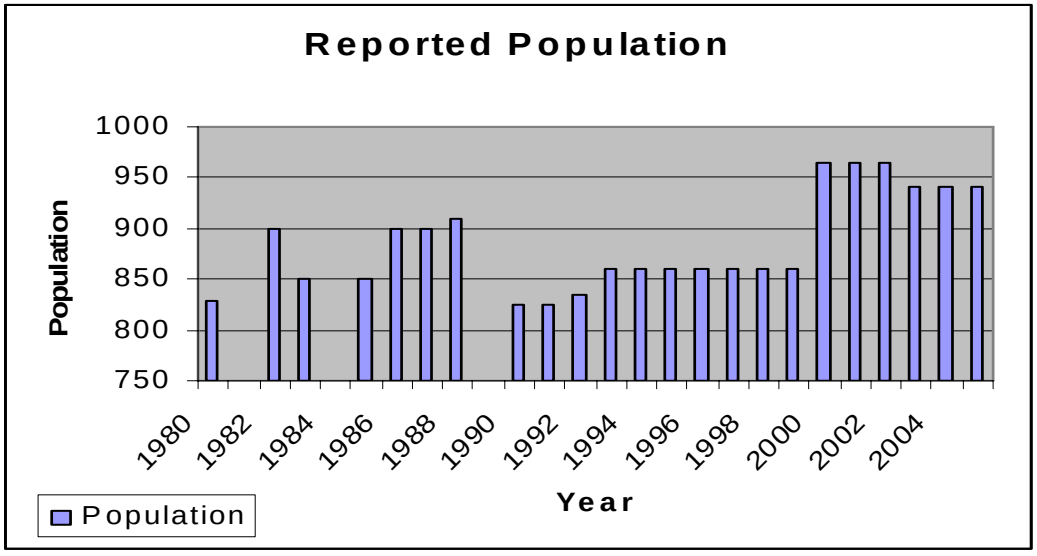
Finished in shallow sand and gravel deposits found within Section14, T.32N., R.7E., Grundy County. The well was drilled to a depth of 27 feet in 2003, and upon completion was pumped at 24 gpm for a short period of time with 14 feet of drawdown. Calculated specific capacity from this test was 1.7 gpm/ft. Static water level was reported as 11 feet below land surface.

Background Pumpage Information



Source: ISWS Illinois Water Inventory Program

Historic Population Information



Source: ISWS Illinois Water Inventory Program

Regional Information

Resources within 5 miles of Mazon (Figure 1).

Domestic Groundwater Supplies
The available regional data indicate that groundwater for domestic and farm use in this part of Illinois is obtained from large-diameter (approximately 3 feet) dug and bored wells and small-diameter drilled wells finished in the unconsolidated materials above bedrock and from small-diameter dilled wells finished within the deep bedrock. The dug and bored wells tap stringers or lenses of silt, sand, or gravel only a few inches thick contained in the unconsolidated materials above bedrock. They range in depth from about 22 to 40 feet. The yield of this type of well is limited to a few hundred gallons per day and may be only barely adequate for normal household uses. The small-diameter drilled wells are finished in sand and gravel deposits found in the unconsolidated materials above bedrock. These wells range in depth from about 36 to 60 feet with some wells reporting sand thicknesses ranging from 15 to 22 feet. These wells are mainly found in Sections 26 and 27, T.32N., R.7E., Grundy County near the West Fork Mazon River and were reported to produce 12 to 15 gpm for short periods of time.

Available information also indicates that several small-diameter wells have been drilled into the shallow bedrock (100 to 200 feet) but reported very limited groundwater with several reporting dry conditions. The small-diameter drilled wells finished within the deeper bedrock (520 to 640 feet) are finished in the St. Peter Sandstone. These wells reported nonpumping water levels ranging from 174 to 239 feet and pumping levels at 219 to 299 feet below land surface. These wells were pumped at 20 gpm for short periods of time.

Municipal Groundwater Supplies
There are only two towns located within 5 miles of Mazon; the Village of Wauponsee, located to the northwest, and Verona, located to the southwest. Neither of these towns report municipal water systems and are presumed to use domestic wells for their water needs.

Resources with 10 miles of Mazon (Figure 2).

Municipal Groundwater Supplies
Towns within 5 to 10 miles of Mazon include: Braceville, Central City, Coal City, Diamond, East Brooklyn, Eileen, Gardner, Godely, Kinsman, Morris, Paytonville, South Wilmington, and Stockdale, all within Grundy County.

Braceville uses one well located in Section 26, T.32N., R.8E., and is finished at a depth of 875 feet (Well #4). This well taps the St. Peter Sandstone and supplies the 1,050 residents with all their water needs. Methane gas is reported from this well.

The Village of Coal City uses four wells for their municipal needs. The wells are located in Sections 2, 3, 22, 34, and 35 of T.32N., R.8E. and are finished at depths of 360, 793, 1,785 and 750 feet below land surface. The wells tap dolomite and sandstones units of the deep bedrock system in this area and are reported to produce from 175 to 750 gpm. The raw water is treated for hydrogen sulfide gas.

The Village of Diamond uses three wells located in Sections 31 and 36, T.33N., R.8E., and are finished at depths of 723, 850, and 875 feet. The wells are pumped at about 100 gpm. The raw water is treated by reverse-osmosis to reduce the Radium.

The Village of Eileen uses two wells located in Section 33N., R.8E., that are both finished at a depth of 700 feet. The wells are finished in the St. Peter Sandstone and reported pumping rates of 65 to 90 gpm upon completion.

The Village of Gardner uses four wells for its water needs. The wells are all located in Section 4, T.31N., R.8E. and are finished at depths of 173, 161, 1933, and 1929 feet. The shallow wells tap the Silurian dolomite and the deep wells tap the Ironton-Galesville sandstone aquifer. These wells reportedly pump at about 35, 45, 575, and 420 gpm, respectively. The water is blended to decrease the radium content of the water.

Kinsman uses one well located in Section 6, T.31N., R.6E. and is finished at a depth of 785 feet. The well produces around 90 gpm and is reported to contain radium above the maximum contaminant level. As part of the village radium compliance plan, two wells have recently been constructed in Section 32, T.32N., R.6E to a depth of 122 feet. These wells are finished in 37 feet of sand and gravel and it is assumed that they will be used to blend groundwater to bring the radium content down.

The City of Morris currently uses three wells located in Section 4, T.33N., R. 7E. The wells are finished at depths of 1485, 1462, and 1451 feet below land surface and tap the Cambrian-Ordovician deep bedrock. The wells produce from 900 to 1200 gpm which is treated by ion-exchange softeners to remove the radium and hardness.

The Village of South Wilmington uses three wells located in Section 11, T. 31N., R.8E. The wells are finished at depths of 993, 970, and 1225 feet below land surface and tap the St. Peter Sandstone bedrock. The wells produce 50, 75, and 192 gpm, respectively. The most recent report indicates that the village was in the process of developing an ion-exchange softening plant for radium compliance.

The other towns within 10-miles of Mazon do not maintain municipal groundwater supplies. Figures 3 and 4 picture the ISWS Potential Yield maps for sand and

gravel and bedrock aquifer in Illinois, respectively. The pertinent counties for Mazon are highlighted. Figure 3 indicates that productive sand and gravel deposits are mainly indicated to the north of the village, along the Illinois River. Variable sand and gravel deposits are also indicated to the south and east of the village.

The bedrock map (Figure 4) indicates favorable conditions for groundwater development from the bedrock throughout the Mazon area. Figures 5 and 6 present the probability of occurrence of the sand and gravel and the water-yielding character of the shallow bedrock for the Mazon area as depicted in the Illinois State Geologic Survey Circular 198, *Groundwater Possibilities in Northeastern Illinois* (Bergstrom, et al., 1957). Figure 5 indicates "Fair to Good," possibilities for moderate supplies to the east and south of the Mazon area. Figure 6 indicates the St. Peter Sandstone lies directly beneath the drift and is capable of development. The summaries of municipal groundwater facilities in this area verify these map outlooks.

Groundwater Availability Summary

Reported information indicates that the sand and gravel deposits surrounding the village are limited in thickness and extent. Historical information indicates that this aquifer is dewatered during dry climatologically periods and that it may not be capable of further expansion by additional wells. Electrical Earth Resistivity work conducted by the State Geological Survey indicated that test drilling to the northeast or south of the present well field would have the best chance at finding additional sands capable of providing groundwater.

Available information also indicates that a deep sandstone well could be used at this location. Several nearby towns have wells finished at depths ranging from 700 to over 1900 feet. Groundwater quality is an issue including concentrations of radium; however, any new deep sandstone well could be used in combination with the existing sand and gravel wells to blend the poorer quality groundwater with the better quality unconsolidated groundwater. This would most likely, keep radium concentrations under control. There are also treatment options that are being employed by nearby towns to rid the radium from the raw groundwater that could be explored.

Figure 1. 5-mile radius map- Mazon

Figure 2. 10-mile radius map- Mazon

Estimated Potential Yields of Sand and Gravel Aquifers
in Mazon Area

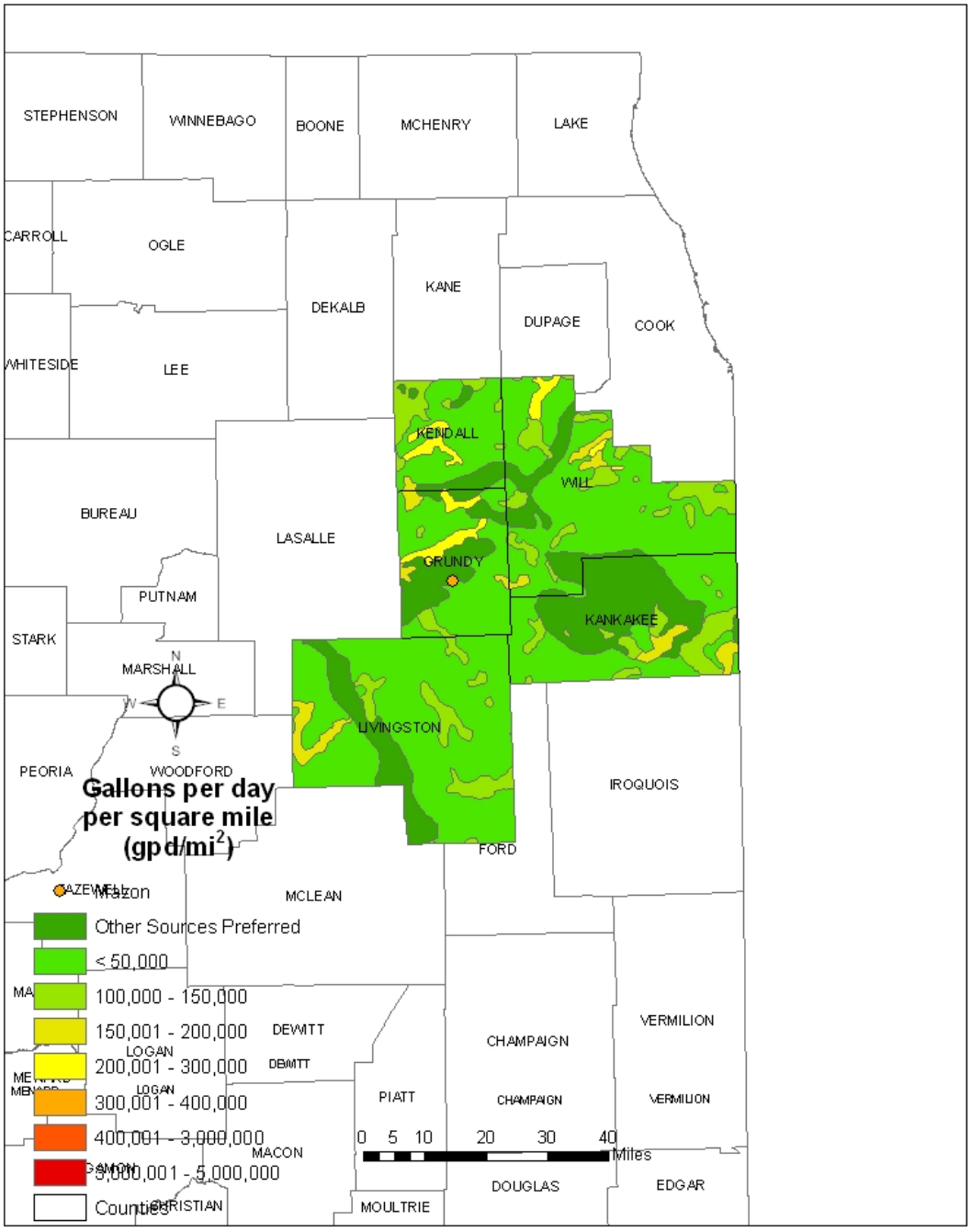


Figure 3.

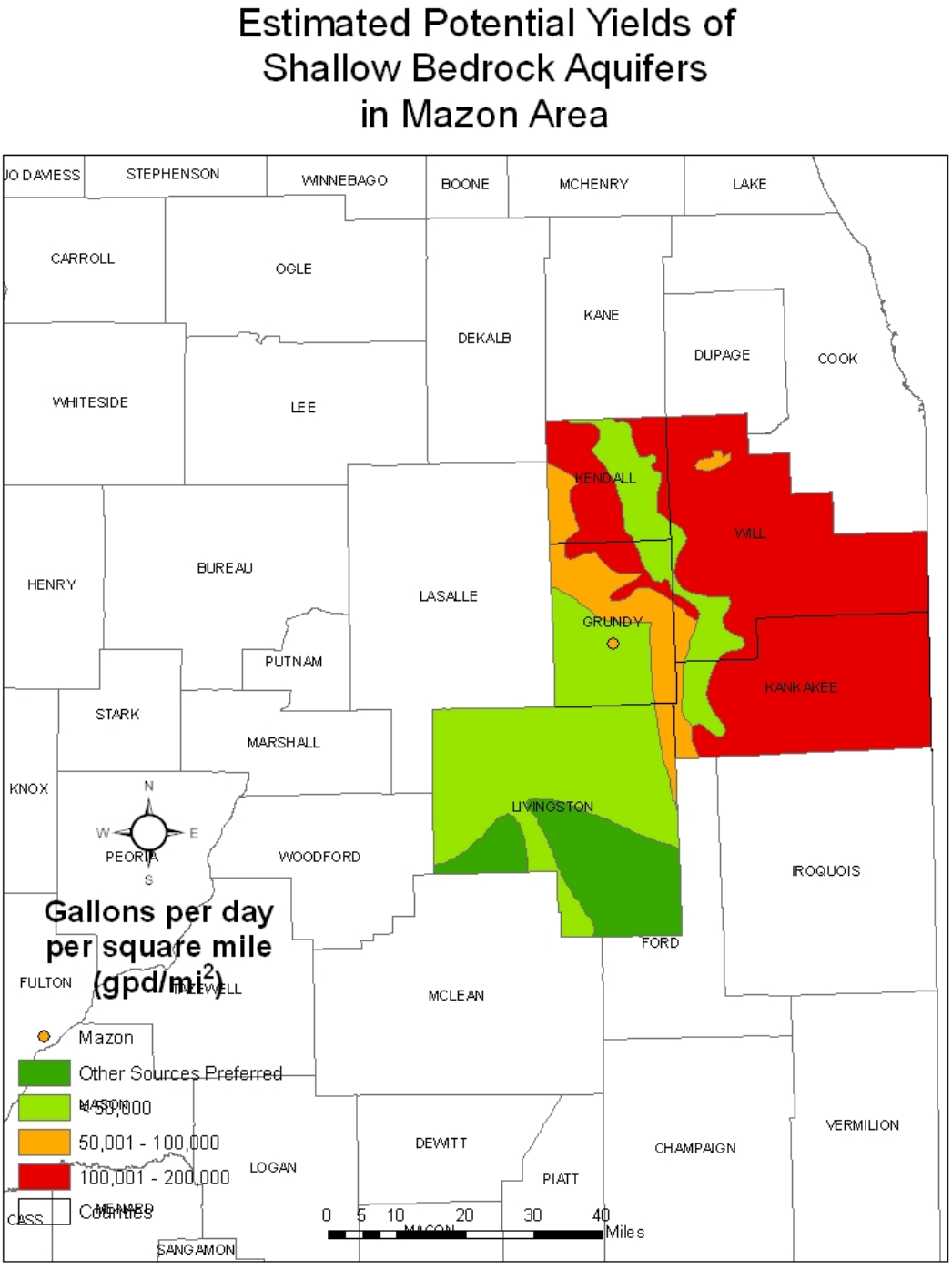

Estimated Potential Yields of
Shallow Bedrock Aquifers
in Mazon Area
JO DAVIESS
STEPHENSON
WINNEBAGO
BOONE
MCHENRY
LAKE
CARROLL
OGLE
DEKALB
KANE
DUPAGE
COOK
WHITESIDE
LEE
KENDALL
WILL
HENRY
BUREAU
LASALLE
GRUNDY
PUTNAM
KANKAKEE
STARK
MARSHALL
KNOX
N
W
E
S
LIVINGSTON
PEORIA
WOODFORD
IROQUOIS
FORD
Gallons per day
per square mile
(gpd/mi2)
FULTON
TAZEWELL
MCLEAN
Mazon
Other Sources Preferred
≤ 50,000
50,001 - 100,000
100,001 - 200,000
Counties
DEWITT
CHAMPAIGN
VERMILION
LOGAN
PIATT
MASON
MENARD
CASS
SANGAMON
0 5 10 20 30 40
Miles

Figure 4.

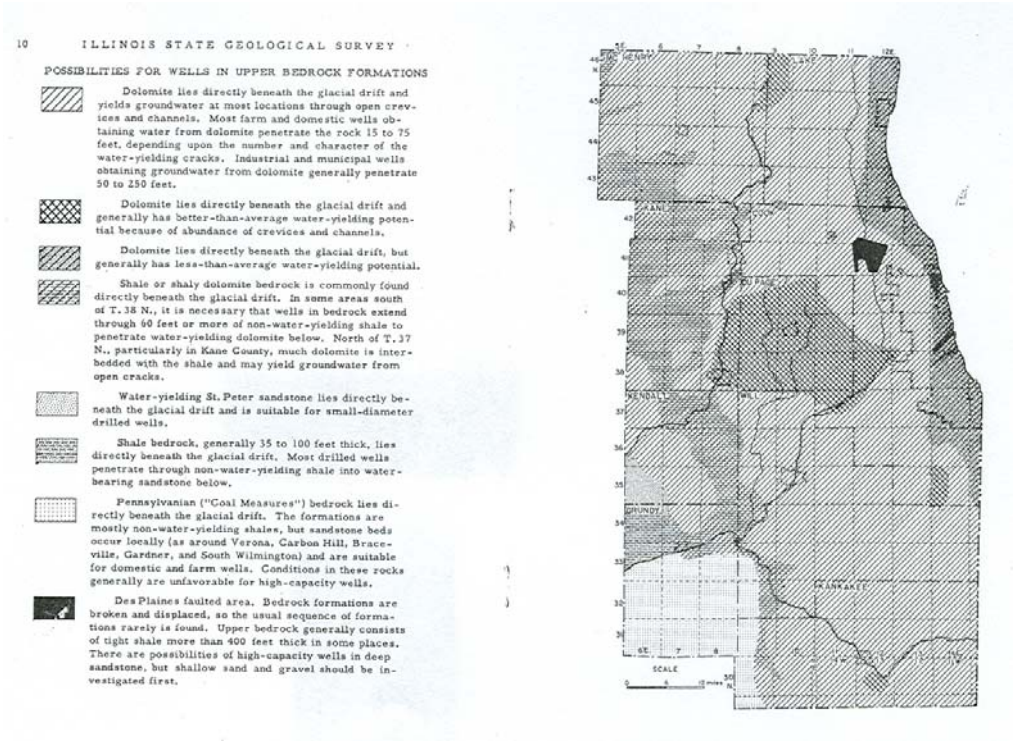


Figure 5. Probabilities of occurrence of sand and gravel aquifers.

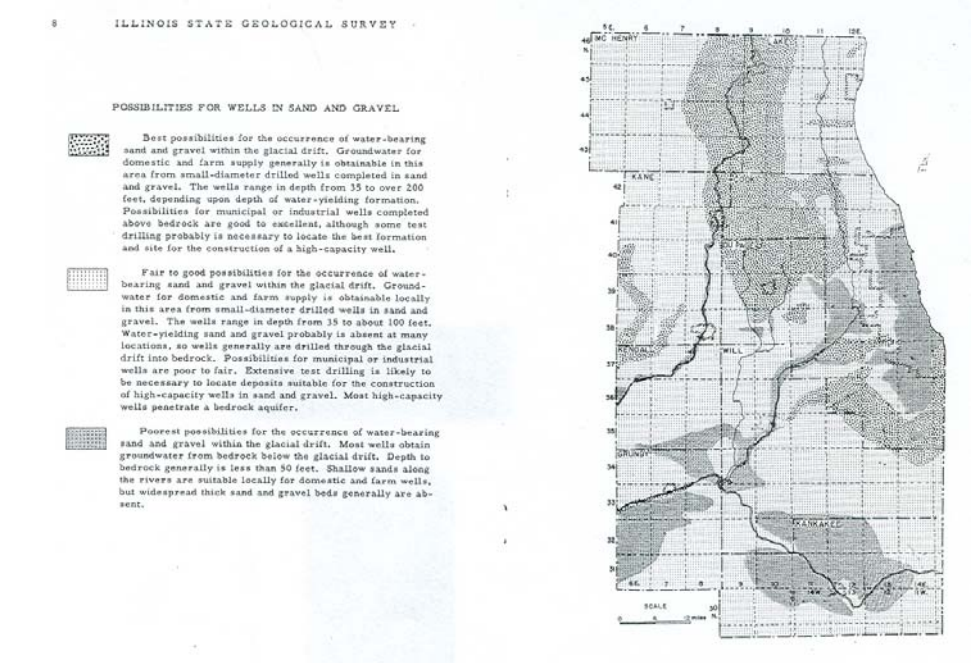


Figure 6. Areal distributioin, type, and water-yielding character of upper bedrock formations.

References

Bergstrom, R.E., J.W. Foster, L.F. Selkregg, and W.A. Pryor. 1955. Groundwater Possibilities in Northeastern Illinois, A preliminary Geologic Report. Illinois State Geological Survey Circular 198.

ISWS publications list for Mazon and surrounding area

(* indicates out of print)

GRUNDY

*1941	B-34	Sandstone water supplies of the Joliet area. Gerber-Larson-et al. 128p.
1950	C-29	Chicago area water supply. 10p.
1959	COOP-1	Preliminary report on ground-water resources of the Chicago region, Illinois. Suter-Bergstrom-Smith-Emrich-Walton-Larson. 89p.
1959	COOP-1s	Summary of preliminary report on ground-water resources of the Chicago region, Illinois. 18p.
*1960	C-79	Water-level decline and pumpage during 1959 in deep wells in the Chicago Region, Illinois. Walton-Sasman-Russell. 39p.
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1964	RS-38	Groundwater supplies of northeastern Illinois, joint discussion: Quality problems in well water. Larson. Potential yield of aquifers and ground water pumpage. Walton.
1965	RI-50	Ground-water pumpage in northeastern Illinois through 1962. Sasman. 31p.
*1966	RI-55	Yields of wells in Pennsylvanian and Mississippian rocks in Illinois. Csallany. 42p.
1967	C-94	Water-level decline and pumpage in deep wells in northeastern Illinois, 1962-1966. Sasman-McDonald-Randall. 36p.
1970	RS-153	Industrial water recirculation in northeastern Illinois. Sasman.
1973	C-113	Water-level decline and pumpage in deep wells in northern Illinois, 1966-1971. Sasman-Benson-Dzurisin-Risk. 41p.
1974	RI-73	Groundwater pumpage in northern Illinois, 1966-1970. Sasman-Benson-Dzurisin- Risk. 46p.
1977	C-125	Water level decline and pumpage in deep wells in the Chicago region, 1971-1975. Sasman-Benson-Mende-Gangler-Colvin. 35p.
*1978	CR-199	Reconnaissance study of final cut impoundments. Gibb-Evans. 101p.
*1978	CR-209	Assessment of public groundwater supplies in Illinois. Visocky-Wehrmann-Kim- Ringler. 193p.
*1979	CR-208	Groundwater conditions and river-aquifer relationships along the Illinois Waterway. Gibb-Noel-Bogner-Schicht. 87p.
1982	C-154	Water level trends, pumpage, and chemical quality in the Cambrian-Ordovician aquifer in Illinois, 1971-1980. Sasman-Benson-Ludwigs-Williams. 64p. $6.00.
*1982	CR-292	Impact of Lake Michigan Allocations on the Cambrian-Ordovician aquifer system. Visocky. 36p.
1985	COOP-10	Geology, hydrology, and water quality of the Cambrian and Ordovician Systems in northern Illinois. Visocky-Sherrill-Cartwright. 136p.

*1986	C-166	Water-level trends and pumpage in the Cambrian and Ordovician aquifers in the Chicago region, 1980-1985. Sasman-Ludwigs-Benson-Kirk. 44p.
*1989	CR-473	Regional assessment of northern Illinois ground-water resources. Nealon-Kirk-Visocky. 83p.
1993	C-177	Water-level trends and pumpage in the deep bedrock aquifers in the Chicago region, 1985-1991. Visocky. 47 p.
1997	C182	Water-level trends and pumpages in the deep bedrock aquifers in the Chicago region, 1991-1995. Visocky. 45p.

KANKAKEE

1950	C-29	Chicago area water supply. 10p.
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1989	CR-456	Summary report: regional assessment of the ground-water resources in eastern Kankakee and northern Iroquois Counties. Cravens-Wilson-Barry. 19p.
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1993	C-177	Water-level trends and pumpage in the deep bedrock aquifers in the Chicago region, 1985-1991. Visocky. 47p.

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*1980	CR-239	Verification of the potential yield of the shallow dolomite aquifer in DuPage County, Illinois. Sasman-Schicht-Benson-Ludwigs. 24p.
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*1988	C-170	Ground-water investigation for siting the superconducting super collider in northeastern Illinois. Visocky-Schulmeister. 84p.
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1997 C182 Water-level trends and pumpages in the deep bedrock aquifers in the Chicago region, 1991-1995. Visocky. 45p.

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*1961 C-83 Water-level decline and pumpage during 1960 in deep wells in the Chicago region, Illinois. Sasman-Prickett-Russell. 43p.

*1961 RI-40 Hydrologic budgets for three small watersheds in Illinois. Schicht-Walton. 40p.

*1962 RI-43 Yields of deep sandstone wells in northern Illinois. Walton-Csallany. 47p.

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*1969 RI-62 Groundwater resources of the buried Mahomet Bedrock Valley. Visocky-Schicht. 52p.

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*1978 CR-199 Reconnaissance study of final cut impoundments. Gibb-Evans. 101p.

*1981	CR-248	Surface water - groundwater quality relationships for a central Illinois watershed. Gibb-O'Hearn. 41p.
1982	C-154	Water level trends, pumpage, and chemical quality in the Cambrian-Ordovician aquifer in Illinois, 1971-1980. Sasman-Benson-Ludwigs-Williams. 64p. $6.00.
1985	COOP-10	Geology, hydrology, and water quality of the Cambrian and Ordovician Systems in northern Illinois. Visocky-Sherrill-Cartwright. 136p.
1986	B-60-33	Public ground-water supplies in Livingston County. Woller-Olson-Sargent- Sanderson. 38p. $5.00.
*1989	CR-473	Regional assessment of northern Illinois ground-water resources. Nealon-Kirk-Visocky. 83p.
1992	COOP-14	Pilot Study: Agricultural chemicals in rural, private wells in Illinois. Schock-Mehnert-Caughey-Dreher-Dey-Wilson-Ray-Chou-Valkenburg-Gosar-Karny-Barnhardt-Black-Brown-Garcia. 84p.
1992	COOP-15	Characterization of the study areas for the Pilot Study: Agricultural chemicals in rural, private wells in Illinois. Barnhardt-Mehnert-Ray-Schock. 114p.